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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/857,031	05/31/2001	Tekeshi Tobinaga	49602	7731
26474	7590	04/02/2004	EXAMINER	
KEIL & WEINKAUF 1350 CONNECTICUT AVENUE, N.W. WASHINGTON, DC 20036			CREPEAU, JONATHAN	
			ART UNIT	PAPER NUMBER

1746

DATE MAILED: 04/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/857,031	Applicant(s) TOBINAGA ET AL.	
	Examiner Jonathan S. Crepeau	Art Unit 1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-25 and 29-31 is/are pending in the application.
- 4a) Of the above claim(s) 19-25, 29 and 30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-18 and 31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 11-25, 29, 30 and newly added claim 31. Claims 19-25, 29, and 30 remain withdrawn from consideration as being drawn to a nonelected invention. Claims 11-18 remain rejected for substantially the reasons of record, and claim 31 is newly rejected under 35 USC §102 as necessitated by amendment. Accordingly, this action is made final.

Claim Rejections - 35 USC § 102

2. Claims 11, 12, 14, 15, 16, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by EP 591782, as evidenced by EP 708454. Schultze et al (U.S. Patent 6,001,464) is taken as an English-language equivalent of EP 591782. Regarding claims 11, 15, 16, and 18, Schultze et al. '464 teach a membrane comprising 20 wt% polyurethane and 3.5 wt% silica in Example 1. This anticipates the ranges recited in claim 11 because it results in 14.9 wt% silica relative to the combined amount of polyurethane and silica. Regarding claim 12, the polyurethane is a thermoplastic elastomer (see col. 3, line 44). Regarding claims 11 and 14, the polyurethane is a segmented polyurethane comprising urethane segments and ester segments (see Example 1). Regarding claim 11, the urethane segments are inherently "hard," and the ester segments are inherently "soft." See page 9, lines 47-50 of EP 708454. Regarding claim 11, the reference teaches in column 4, line 1 that the segmented polyurethane has a "softening point" of higher

than 140 degrees C. Additionally, the disclosure that the polyurethane is made of an aromatic diisocyanate and a short-chain aliphatic diol with a C/O ratio of 2 (see col. 5, line 59) is considered to be anticipatory of the hard segment having a melting point of more than 100 degrees C (note section 5 below).

Thus, the instant claims are anticipated.

3. Claims 11-18 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 8-59981. Regarding claims 11 and 12, in the abstract, the reference teaches a membrane comprising 100 weight parts of polyurethane-based resin (containing 75-95 wt% thermoplastic polyurethane elastomer) and 5-40 weight parts of a filler. Regarding claim 11, in paragraph 14 (Example 1) and Table 1 of the translation, the reference teaches that the polyurethane elastomer is present in an amount of 85 weight parts, EPDM is present in an amount of 15 weight parts, and the filler is present in an amount of 30 weight parts. Thus, the polyurethane comprises 65.4 wt% of the total, and the filler comprises 23.1 wt% of the total. This is considered anticipatory of the ranges recited in claim 11. Regarding claims 13 and 15-18, the filler of Example 1 is calcium carbonate having an average particle size of 2 microns. Regarding claims 15-18, the filler may also comprise various oxides, sulfates, and carbonates (see paragraph 10). Regarding claims 11 and 14, the polyurethane is a segmented polyurethane comprising urethane segments and soft ether segments (see abstract). Regarding claim 11, the urethane segments are inherently "hard." Regarding claim 11, the disclosure that the polyurethane is made of an aromatic diisocyanate (e.g., 4,4'-diphenylmethane diisocyanate) and a short-chain glycol (e.g., 1,4-butanediol) (see

Art Unit: 1746

paragraph 6) is considered to be anticipatory of the hard segment having a melting point of more than 100 degrees C (note section 5 below).

Thus, the instant claims are anticipated.

4. Claims 11-18 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Chang et al (U.S. Patent 5,346,788). Regarding claim 11, Chang et al. teach a polyurethane-based membrane used as an electrochemical cell separator in the abstract. The membrane comprises a filler (see abstract). Regarding claims 15-18, the filler may comprise various oxides, carbonates, minerals, and silicates (see col. 8, line 34-52). Regarding claim 13, the particle size of the filler is preferably 0.01-50 microns (see col. 8, line 26). Since this range overlaps with the range recited in claim 13, it anticipates the range in the overlapping portion (0.01-30 microns). Furthermore, Example 1 teaches a specific silica filler particle size of 10 microns, which also anticipates the range of claim 13. Regarding claim 12, the polyurethane is thermoplastic (see abstract). Regarding claim 11, the reference teaches in Example 1 that the separator contains 120 weight parts of polyurethane and 150 weight parts of silica. This anticipates the claimed ranges because it results in 44 wt% polyurethane and 56 wt% silica, relative to the combined amount of polyurethane and silica. Regarding claim 11, the polyurethane is a segmented polyurethane comprising hard segments and soft segments (see col. 4, lines 19-48). Regarding claim 14, the soft segments comprise ether linkages (see col. 5, line 44-col. 6, line 5). Regarding claims 11 and 31, the disclosure that the polyurethane is made of a diisocyanate (e.g., MDI) and a short-chain glycol (see col. 7, line 5 et seq.) is considered to be anticipatory of the hard

segment having a melting point of more than 100 degrees C (note section 5 below). Regarding claim 31, the hard segment (component c) has a molecular weight of 50-400, and the soft segment (component b) has a molecular weight of 500-20000, both of which are anticipatory of the claimed ranges (see col. 4, line 30 et seq.). The soft segment has a glass transition temperature of less than 20 degrees C, which also anticipates the range recited in claim 31.

Thus, the instant claims are anticipated.

Response to Arguments

5. Applicant's arguments filed December 23, 2003 have been fully considered but they are not persuasive. Regarding the by EP 591782 (US 6,001,464) reference, Applicants assert that the reference teaches only 3.5 weight percent silica in the membrane composition, therefore falling outside the claimed range. However, the polyurethane, which is present in an amount of 20 wt%, and the silica (3.5%) may be considered to be its own "composition," even though the membrane contains other components. Therefore, based on only the weights of the polyurethane and the silica, the silica comprises 14.9 wt% of the combined mixture. Accordingly, the range of claim 1 is still believed to be met by the reference.

Regarding Applicants' assertions that none of the applied references teach that the melting point of the hard segment is higher than 100 degrees C, the references are considered to anticipate this limitation based on the materials that are disclosed as being used to make the polyurethane. As noted above, each reference discloses an aromatic diisocyanate and a short-chain diol. Applicant's attention is directed to page 6 of WO 96/03781, which shows the

Art Unit: 1746

reaction steps involved in forming a segmented polyurethane using these components. In particular, the reference uses diphenyl methane diisocyanate (MDI) and butane diol as the reactants to form the “hard segment.” The condensation reaction would result in a hard segment wherein one of the isocyanate groups was made into a urethane group, which would also be connected to a butyl group.

Applicant’s attention is further directed to the copy of *Properties of Polymers*, Chapter 6, by Van Krevelen, enclosed herewith. Formula 6.16 on page 114 gives a formula for calculating the contributions of various groups (Y_m) to a polymer segment melting point. Formula 6.14 allows for the determination of the melting point by dividing the obtained Y_m by the molecular weight of the segment. In this case, the segment is considered to include the following components: a urethane group (second-to-last entry, Table 6.6), four methylene groups (first entry, Table 6.6), and a diphenyl methane group (Table 6.8, second entry). The combined molecular weight for these groups is $166 + 59 + 4(14) = 281$. The contributions for Y_{mi} are as follows: $90,000 - 16,000$ [correction factor] $+ 42,000 + 4(5700) = 138800$. A further correction factor based on $Y_{mi}(I_x)$ must be introduced for the urethane group. The urethane group contains three chain atoms and is bordered by the butyl group. Thus, $I_x = 3 / (3+4) = 0.43$ (see formula 6.6). Thus, the $Y_{mi}(I_x)$ for the urethane group is -9149.9 , which is added to the Y_{mi} given above to give a total Y_{mi} of 129650.1 . This total is divided by the total molecular weight obtained above to obtain a segment melting temperature of 461.4 Kelvin (188.4°C). Accordingly, as this temperature is within the claimed range of at least 100°C , the range is considered to be anticipated by each of the applied references.

Art Unit: 1746

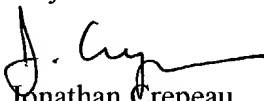
Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (571) 272-1302. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (703) 872-9306.


Jonathan Crepeau
Patent Examiner
Art Unit 1746
March 30, 2004